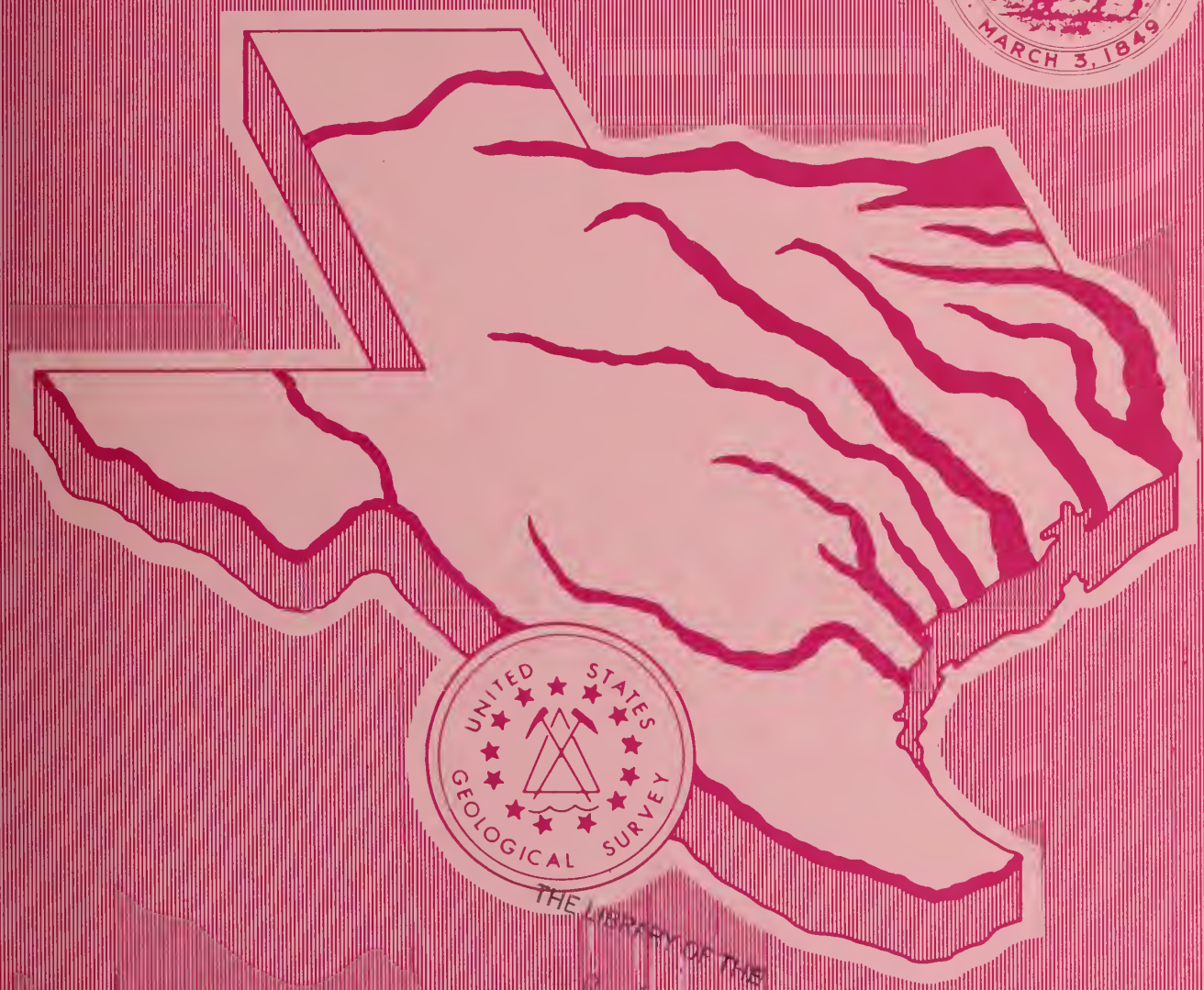
551.49
Un3425w
1973/74

Water-Resources Investigations In Texas

Fiscal Year 1974



THE LIBRARY OF THE
JUL 1 1974
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS IN TEXAS FISCAL YEAR 1974

Austin, Texas

February 1974

CONTENTS

	Page
Introduction	4
Collection of basic records	5
Surface-water records	5
Continuous-record streamflow stations	5
Partial-record streamflow stations	5
Low-flow partial-record stations	5
Crest-stage partial-record stations	5
Tide-level stations	5
Continuous water-quality stations	5
Daily water-quality stations	5
Daily chemical-quality stations	5
Daily suspended-sediment stations	5
Partial-record water-quality stations	5
Partial-record chemical-quality stations	5
Special periodic water-quality sampling sites	5
Periodic suspended-sediment stations	5
Lake and reservoir studies	6
Summary of scheduled changes in data stations	7
New stations to be established	7
Stations to be discontinued	9
Ground-water records	13
Project studies	13
Hydrologic studies of small watersheds	13
Urban-hydrology studies	14
Austin project	14
Houston project	15
Dallas project	15
San Antonio project	16
Fort Worth project	16
Dallas County project	16
Flood stages and discharges for small streams in Texas (Highway Program)	17
Chemical and physical characteristics of water in estuaries of Texas	17
Pesticides program	17
Continuing ground-water studies	17
Houston area	18
Galveston County	18

Page

Project studies--Concluded
Continuing ground-water studies--Concluded
El Paso area---- 18
San Antonio area and Balcones Fault Zone---- 18
Orange County and adjacent areas---- 18
Other interpretive studies---- 19
Water resources of Big Bend National Park---- 19
Artificial-recharge research on the High Plains of Texas and New Mexico---- 19
Water resources of Guadalupe Mountains National Park---- 19
Hydrologic-research studies of the Edwards and associated limestones---- 19
Analog-model study of ground water in the Houston area---- 19
Digital-model study of the Chicot and Evangeline aquifers of the Texas Gulf Coast---- 20
Rio Grande environmental study---- 20
Land-surface subsidence in the Baytown area---- 20
Mapping of flood-prone areas---- 20
Galveston Bay inflow study---- 20
Land-surface subsidence in the Texas City and Seabrook areas---- 21
Trinity River time-of-travel study---- 21
Salt-water encroachment, Houston area---- 21
Summary appraisals of the Nation's ground-water resources - Texas Gulf Region---- 21
Trinity River basin water-quality monitoring network---- 22
Reports in preparation, released, or published during fiscal year 1974---- 23
Basic-data reports---- 23
Water-resources data for Texas---- 23
Hydrologic studies of small watersheds---- 23
Urban hydrology studies---- 23
Flood stages and discharges for small streams in Texas (Highway Program)---- 23
Water-quality basic-data reports---- 24
Ground-water and other basic-data reports---- 24
Analytical or interpretive reports---- 24
County ground-water appraisal reports---- 24
Other analytical or interpretive reports---- 25
Maps of flood-prone areas in Texas---- 26
Selected list of available reports of general interest---- 30
Summary of cooperation---- 33

WATER RESOURCES INVESTIGATIONS IN TEXAS

FISCAL YEAR 1974

INTRODUCTION

The water-resources investigations in Texas consist of the collection of basic records through the hydrologic-data network, interpretive studies, and research projects. The basic-data records and the results of investigations are published by the Geological Survey or by cooperating agencies. This report describes the water-resources projects and activities of the Geological Survey in Texas for the 1974 fiscal year (July 1, 1973, to June 30, 1974).

The Geological Survey's investigations of the water resources of Texas are under the general direction of I. D. Yost, District Chief. The Texas District office is in the Federal Building, 300 East Eighth Street, Austin, Texas 78701.

Copies of published records, copies of basic-data prior to publication, and copies of other unpublished records may be obtained from the District office by request.

Information regarding provisional records of stream discharge prior to publication and other hydrologic data collected within their respective areas may be obtained from the Subdistrict offices in Fort Worth, Houston, San Angelo, San Antonio, and Wichita Falls or the Austin Field Unit in Austin. Requests for information should be addressed as follows:

I. D. Yost, District Chief
U.S. Geological Survey
Rm. 649, 300 E. 8th St.
Austin, TX 78701

W. D. Robbins, Acting Chief
Austin Field Unit
U.S. Geological Survey
Rm. 867, 300 E. 8th St.
Austin, TX 78701

R. E. Smith, Subdistrict Chief
U.S. Geological Survey
Rm. 174, 2320 La Branch St.
Houston, TX 77004

J. H. Montgomery, Subdistrict Chief
U.S. Geological Survey
P.O. Box 6976
Bldg. 23, Felix and Hemphill Sts.
Fort Worth, TX 76115

E. S. Denison, Subdistrict Chief
U.S. Geological Survey
1409 Knickerbocker Rd.
San Angelo, TX 76901

A. E. Hulme, Subdistrict Chief
U.S. Geological Survey
Rm. 116, 7077 San Pedro
San Antonio, TX 78216

J. O. Joerns, Subdistrict Chief
U.S. Geological Survey
318-320A Federal Bldg.
Wichita Falls, TX 76301

COLLECTION OF BASIC RECORDS

A significant activity in the Texas District is the collection of basic hydrologic data. A continuing series of measurements and analyses are made of streamflow, reservoir contents, chemical quality of water, sediment in streams and reservoirs, water levels in wells, and land-surface subsidence.

Modern computer techniques are being used successfully in the collection and publication of water data. By the end of the 1974 fiscal year, the following installations will be in operation: Approximately 430 digital recorders at stream-gaging stations; 29 conductivity recorders; and 1 instrument for continuously and simultaneously monitoring and recording the water-quality characteristics of conductivity, water temperature, dissolved oxygen, and pH. The use of electronic data processing for printing and storing water records will be expanded.

Surface-Water Records

Continuous-Record Streamflow Stations

As of June 30, 1973, 567 stream-gaging, stage-only, and reservoir-contents stations were in operation. During the 1974 fiscal year, 13 stations will be established, and 29 stations will be discontinued.

Partial-Record Streamflow Stations

Low-flow partial-record stations.--As of June 30, 1973, 98 low-flow partial-record stations were in operation. During the 1974 fiscal year, 2 stations are scheduled to be established and 15 stations will be discontinued (not listed in summary of scheduled changes in data stations table).

Crest-stage partial-record stations.--As of June 30, 1973, 190 crest-stage partial-record stations were in operation. Of these, 40 were operated in the urban hydrology study areas in Dallas, Houston, and San Antonio. Three additional stations are scheduled to be established during the 1974 fiscal year and 20 stations will be discontinued (not listed in summary of scheduled changes in data stations table).

Tide-level stations.--As of June 30, 1973, 35 tide-level stations were in operation. During the 1974 fiscal year, no stations will be established.

Continuous Water-Quality Stations

As of June 30, 1973, 1 multiparameter water-quality monitor and 29 conductivity recorders were in operation. No additional conductivity recorders will be established during the 1974 fiscal year. The water-quality monitor is located on the Sabine River and the conductivity recorders are located at stations in the Red, Neches, Brazos, Colorado, and Guadalupe River basins.

Daily Water-Quality Stations

Daily chemical-quality stations.--As of June 30, 1973, 111 daily chemical-quality stations were in operation. Sufficient samples were collected at these stations to define the total daily chemical loads. During the 1974 fiscal year, no new stations will be established.

Daily suspended-sediment stations.--As of June 30, 1973, 7 daily suspended-sediment stations were in operation. One station will be discontinued during the 1974 fiscal year, and no stations are scheduled to be established.

Partial-Record Water-Quality Stations

Partial-record chemical-quality stations.--As of June 30, 1973, the partial-record chemical-quality network consisted of stations at 138 sites on streams and stations at sites on 55 reservoirs. During the 1974 fiscal year, no new stations will be added to the network.

Special periodic water-quality sampling sites.--Special periodic sampling will be done during the 1974 fiscal year at 156 stations. The analyses will include determinations of standard chemical-quality, BOD (biochemical oxygen demand), DO (dissolved oxygen), NO_3 (nitrate), PO_4 (phosphate), pH, pesticides in unfiltered water samples and bottom deposits, and minor elements.

Periodic suspended-sediment stations.--The periodic suspended-sediment station network was established in 1966, and as of June 30, 1973, 37 stations were in operation. No expansion of this network is anticipated during the 1974 fiscal year.

Lake and Reservoir Studies

The fiscal 1974 program provides for three water-quality surveys each of: Lake Meredith, Greenbelt Reservoir, Lake Arlington, Livingston Reservoir, Lake Conroe, Hubbard Creek Reservoir, Possum Kingdom Reservoir, Lake Granbury, Whitney Lake, Belton Lake, Canyon Lake, and Lake Corpus Christi; and two surveys of Sam Rayburn Reservoir. On-site determinations will be made of specific conductance, dissolved oxygen, temperature, and pH, Samples will be collected for laboratory analyses during each survey.

Summary of Scheduled Changes in Data Stations

Type of record: C--crest-stage partial-record; D--streamflow; G--stage only; L--low-flow partial-record; R--reservoir content; T--tide level

New Stations to be Established

Name of station	Type of record	Cooperation with USGS	Purpose of station and remarks
07227920 Dixon Creek near Borger, Tex.	D	Texas Water Development Board	Station is needed to define hydraulic characteristics in this area at this time.
07344475 Big Cypress Creek near Winnsboro, Tex.	D	Franklin Co. Water District through Texas Water Development Board	Aid in water management in Cypress basin.
07344480 Lake Cypress Springs near Newsome, Tex.	R	do	do
07345500 Ellison Creek Reservoir near Lone Star, Tex.	R	Lone Star Steel Co. through Texas Water Development Board	do
08022075 Martin Creek near Tatum, Tex.	D	Texas Utilities Services Inc. through Texas Water Development Board	Aid in water management in Sabine basin.
08057418 Fivemile Creek at West Kiest Boulevard, Dallas, Tex.	C	City of Dallas	To study the effects of urbanization.
08057435 Newton Branch at Interstate Highway 635, Dallas Tex.	C	do	do
08057440 Whites Branch at Interstate Highway 635, Dallas, Tex.	C	do	do
08066230 Tempe Creek near Livingston, Tex.	L	Trinity River Authority through Texas Water Development Board	Water quality control for Livingston Reservoir.
08068420 Panther Branch below Bear Branch near Egypt, Tex.	D	George Mitchell Associates through Texas Water Development Board	To study the effects of urbanization.
08072400 Buffalo Bayou near Clodine, Tex.	D	Corps of Engineers	To provide assistance in managing and metering inflows to Barker and Addicks Reservoirs.
08072700 South Mayde Creek near Addicks, Tex.	D	do	do
08072800 Langham Creek near Addicks, Tex.	D	do	do
08091750 Squaw Creek near Glen Rose, Tex.	D	Texas Utilities Services Inc. through Texas Water Development Board	To provide assistance in managing and metering Squaw Creek Lake releases.
08102600 Nolan Creek at Belton, Tex.	D	Brazos River Authority through Texas Water Development Board	To provide data on the effects of a regional sewer facility.

New Stations to be Established--Concluded

Name of station	Type of record	Cooperation with USGS	Purpose of station and remarks
08158920 Williamson Creek at Oak Hill, Tex.	L	Texas Water Development Board	To provide data on ground-water surface-water interchange.
08202800 Parker Creek at Reservoir near D'Hanis, Tex.	D	Edwards Underground Water District through Texas Water Development Board	For ground-water recharge studies.
08447020 Independence Creek near Sheffield, Tex.	D	Texas Water Development Board	Station is needed to define hydraulic characteristics in this area at this time.

Summary of Scheduled Changes in Data Stations

Type of record: C--crest-stage partial-record; D--streamflow; G--stage only; L--low-flow partial-record; R--reservoir content; T--tide level

Stations to be Discontinued

Name of station	Type of record	Cooperation with USGS	Reason for discontinuance
07227448 Punta de Agua Creek near Channing, Tex.	D	Texas Water Development Board	Infeasible to gage.
07295500 Tierra Blanca Creek above Buffalo Lake near Umbarger, Tex.	D	do	USGS participation no longer necessary.
07296000 Buffalo Lake near Umbarger, Tex.	R	do	do
07296100 Tierra Blanca Creek below Buffalo Lake near Umbarger, Tex.	D	do	do
07298000 North Tule Draw at Reservoir near Tulia, Tex.	D	do	Sufficient data have been collected.
07315550 Farmers Creek near Saint Jo, Tex.	C	Texas Highway Department	do
07343350 Dial Branch near Bagwell, Tex.	C	do	do
07344490 Dragoo Creek near Mt. Pleasant, Tex.	C	do	do
08017500 Sabine River near Emory, Tex.	D	Sabine River Authority through Texas Water Development Board	do
08018200 Grand Saline Creek near Grand Saline, Tex.	D	Texas Water Development Board	Partial-record sufficient. Converted to (L).
08020800 Grace Creek trib. at Longview, Tex.	C	Texas Highway Department	Sufficient data have been collected.
08022010 Redmon Branch near Hallsville, Tex.	C	do	do

Stations to be Discontinued--Continued

Name of station	Type of record	Cooperation with USGS	Reason for discontinuance
08022400 Socagee Creek near Carthage, Tex.	D	Sabine River Compact Admin. and Texas Water Development Board	Sufficient data have been collected.
08024400 Sabine River near Milam, Tex.	G	Sabine River Compact Admin.	do
08032100 Hurricane Creek trib. near Palestine, Tex.	C	Texas Highway Department	do
08039500 Angelina River at Horger, Tex.	D	Corps of Engineers	Conditions unsatisfactory for obtaining reliable results.
08041400 Drakes Branch near Spurger, Tex.	C	Texas Highway Department	Sufficient data have been collected.
08044200 Walker Creek near Boyd, Tex.	C	do	do
08048800 Big Fossil Creek at Haltom City, Tex.	D	Tarrant Co. WCID #1 through Texas Water Development Board	Flood-stage sufficient. Converted to stage only (G).
08050200 Elm Fork Trinity River subwatershed No. 6-0 near Muenster, Tex.	D	City of Dallas through Texas Water Development Board	Sufficient data have been collected.
08050300 Elm Fork Trinity River near Muenster, Tex.	D	do	do
08057500 Honey Creek subwatershed No. 11 near McKinney, Tex.	D	Soil Conservation Service and Texas Water Development Board	do
08058500 Honey Creek near McKinney, Tex.	D	do	do
08062850 Bachelor Creek near Terrel, Tex.	C	Texas Highway Department	do
08065500 Trinity River near Midway, Tex.	G	Corps of Engineers	Station is in backwater from Lake Livingston.
08066050 West Carolina Creek near Oakhurst, Tex.	L	Trinity River Authority through Texas Water Development Board	Sufficient data have been collected.
08066140 Tantabogue Creek near Trinity, Tex.	L	do	do
08066145 Caney Creek near Groveton, Tex.	L	do	do
08066180 Rocky Creek near Onalaska, Tex.	L	do	do

Stations to be Discontinued--Continued

Name of station	Type of record	Cooperation with USGS	Reason for discontinuance
08066280 Bluff Creek trib. near Livingston, Tex.	C	Texas Highway Department	Sufficient data have been collected.
08066800 Gaylor Creek near Moss Hill, Tex.	L	Trinity River Authority through Texas Water Development Board	do
08067750 Landrum Creek trib. near Montgomery, Tex.	C	Texas Highway Department	do
08077550 Cowart Creek near Friendswood, Tex.	C	do	do
08089100 Elm Creek trib. near Graford, Tex.	C	do	do
08091700 Panter Branch near Tolar, Tex.	C	do	do
08093200 Bond Branch near Hillsboro, Tex.	C	do	do
08094500 Green Creek near Alexander, Tex.	D	Texas Water Development Board	do
08100800 Hoffman Branch near Hamilton, Tex.	C	Texas Highway Department	do
08103300 Sulphur Creek below Gold Springs at Lampasas, Tex.	L	City of Lampasas through Texas Water Development Board	do
08103400 Sulphur Creek below Hancock Springs at Lampasas, Tex.	L	do	do
08103500 Hannah Springs at Lampasas, Tex.	L	do	do
08103700 Sulphur Creek below Lampasas, Tex.	L	do	do
08104200 Salado Creek above Salado Springs near Salado, Tex.	L	Texas Water Development Board	do
08104300 Salado Springs at Salado, Tex.	L	do	do
08105000 San Gabriel River at Georgetown, Tex.	D	do	do
08105200 Berry Creek near Georgetown, Tex.	L	do	do

Stations to be Discontinued--Concluded

Name of station	Type of record	Cooperation with USGS	Reason for discontinuance
08108200 North Elm Creek near Cameron, Tex.	D	Texas Water Development Board	Sufficient data have been collected.
08112500 Brazos River Authority's Canal A near Fulshear, Tex.	D	Brazos River Authority through Texas Water Development Board	do
08114900 Seabourne Creek near Rosenberg, Tex.	C	Texas Highway Department	do
08136900 Mukewater Creek subwatershed No. 10A near Trickham, Tex.	D	Soil Conservation Service and Texas Water Development Board	do
08137500 Mukewater Creek at Trickham, Tex.	D	do	do
08139500 Deep Creek near Mercury, Tex.	D	do	do
08158800 Onion Creek at Buda, Tex.	L	Texas Water Development Board	do
08159200 Colorado River at Bastrop, Tex.	D	Lower Colorado River Authority through Texas Water Development Board	do
08159300 Cedar Creek near Bastrop, Tex.	L	Texas Water Development Board	do
08159400 Piney Creek near Bastrop, Tex.	L	do	do
08172100 West Elm Creek near Niederwald, Tex.	C	Texas Highway Department	do
08180500 Medina River near Riomedina, Tex.	D	Texas Water Development Board	do
08187000 Escondido Creek subwatershed No. 1 near Kenedy, Tex.	D	San Antonio River Authority through Texas Water Development Board	do
08187500 Escondido Creek at Kenedy, Tex.	D	do	do
08189600 Olmos Creek trib. near Skidmore, Tex.	C	Texas Highway Department	do
08207700 Lucas Creek near Pleasanton, Tex.	C	do	do
08414000 Pecos River near Mentone, Tex.	D	Pecos River Commission	Condition unsatisfactory.
08449000 Devils River near Juno, Tex.	D	Texas Water Development Board	Sufficient data have been collected.

Ground-Water Records

A network of observation wells for observing fluctuations in ground-water levels, changes in chemical quality of ground water, and subsidence of the land surface is maintained in areas of large ground-water development. The periodic collection of ground-water data can be used in solving such specific problems as over-development and its relation to pumping costs, relationship of recharge to discharge of an aquifer, and the relationship of the quality of ground water to the development and use of the water in storage.

The observation-well network is confined to the areas of continuing ground-water studies in the Houston area, Galveston County and adjacent areas, San Antonio area and Balcones Fault Zone, El Paso area, and Orange County and adjacent areas. As of June 30, 1973, the Geological Survey was monitoring more than 1,200 wells. The types and numbers of observation wells programmed for the 1974 fiscal year by areas are given below.

Area	Water levels		Chemical quality	Subsidence
	Periodic	Continuous		
Houston area	500	6	90	5
Galveston County and adjacent areas	90	2	35	1
San Antonio area and Balcones Fault Zone	8	10	5	0
El Paso area	244	10	14	0
Orange County and adjacent areas	87	1	58	0

PROJECT STUDIES

Hydrologic Studies of Small Watersheds

The U.S. Soil Conservation Service (SCS) has an extensive program of constructing floodwater-retarding structures in small watersheds in Texas. These structures, which are designed to control floodflows and sediment movement, will have varying but important effects on the natural surface- and ground-water resources of river basins, especially where a large number of them are built. The need has grown for basic hydrologic data on these small watersheds to compare the hydrology under natural and developed conditions. It is, therefore, essential that the hydrologic studies determine the extent to which the floodwater-retarding structures affect the volume and mode of occurrence of runoff.

The specific objectives of these studies are:

(1) To determine the net effect of floodwater-retarding structures on the regimen of streamflow at downstream points.

(2) To determine the effectiveness of the structures as ground-water recharge facilities.

(3) To determine the effect of the structures on the sediment yield at downstream points.

(4) To develop relationships between maximum rates and volumes of runoff with rainfall in small natural watersheds.

(5) To develop a stream-system model for basins with floodwater-retarding structures.

(6) To determine the minimum instrumentation necessary for estimating the flood hydrographs below a system of structures, as needed for downstream water-management operations.

Hydrologic studies of SCS-developed areas in Texas, which were started in 1951, have been made by the Geological Survey in 12 small watersheds to provide the needed data for analyses. The U.S. Soil Conservation Service, Texas Water Development Board, San Antonio River Authority, city of Dallas, and the Tarrant County Water Control and Improvement District No. 1 cooperated with the Geological Survey in these studies. The 12 study areas were chosen on a Statewide basis to sample watersheds having different rainfall, topography, geology, and soils. In five of the study areas, streamflow and rainfall records were collected prior to construction of the floodwater-retarding structures, thus affording the opportunity for analyses of the hydrologic conditions before and after construction.

The 12 study areas, which are in four major river basins, are North Creek, Elm Fork Trinity River, Little Elm Creek, Honey Creek, and Pin Oak Creek, all in the Trinity River basin; Green Creek, Cow Bayou, Little Pond-North Elm Creeks, in the Brazos River basin; Deep Creek and Mukewater Creek in the Colorado River basin; and Escondido Creek and Calaveras Creek in the San Antonio River basin.

The long-range plan for the small-watershed studies specified that the data-collection program in each study area be skeletonized when data were sufficient to accomplish the objectives as limited by the instrumentation in the particular study area. In keeping with this plan, data-collection programs have been skeletonized as follows: Green Creek study area in 1967; Elm Fork Trinity River and Calaveras Creek study areas in 1968; Honey Creek study area in 1969; and Escondido Creek study area in 1970.

During the 1972 fiscal year, basic-data reports, which present a compilation of the annual hydrologic data, were prepared for each study area. A reevaluation of the long-range plan led to discontinuing rain-gage networks in October 1971 in the following skeletonized study areas: Green Creek, Honey Creek, Deep Creek, Escondido Creek, and Calaveras Creek. Data collection in the North Creek study area was expanded to include five floodwater-retarding structures completed during the year.

During the 1973 fiscal year, further reductions in data collection and analysis were initiated in this project. All data collection in the Pin Oak Creek study area was discontinued October 1, 1972. The annual preparation of basic-data reports and storm analyses was discontinued for all skeletonized study areas. An interpretive report on studies in the Honey Creek area will be completed during fiscal year 1974.

Further reductions in data collection in the project will be carried out in the 1974 fiscal year so that study areas remaining in the project after September 30, 1973, will be only those in the North Creek, Little Elm Creek, and Cow Bayou watersheds. Data collection in these study areas will continue until sufficient "after-development" data have been collected to afford interpretive analyses leading to attainment of the objectives of the project.

Urban-Hydrology Studies

Society is confronted with the most urgent water problems in urban areas, where residential, commercial, and industrial complexes may be subject to potentially destructive floods and where lives and vast sums of money can be saved if metropolitan drainage systems and water-control facilities are properly planned.

Because undeveloped land is being converted to urban use, the amount of impervious surface area is increased, which results in a change in the runoff pattern. Higher peak discharges may result and may be accompanied by more rapid removal of the storm runoff. Drainage systems that were constructed prior to urbanization must be redesigned to function properly under conditions of ultimate land development. Because of these requirements, hydrologic data are needed to define the effects of urbanization on the magnitude of floodflow and runoff from small drainage areas.

The Geological Survey, in cooperation with State and local agencies, is making hydrologic studies in the Austin, Dallas, Dallas County, Houston, Fort Worth, and San Antonio areas. These studies will provide data necessary for defining the changes in storm runoff resulting from progressive urban development and for defining flood boundaries and depths of inundation for floods of various magnitudes and frequencies.

Austin Project

The Austin project, which began in 1954, is in cooperation with the Texas Water Development Board. The objectives of the project are to provide basic rainfall and runoff data and to provide data showing the effects of progressive urbanization on infiltration, rates of peak discharge, and rainfall-runoff relations. The project also provides applied research facilities for students at The University of Texas at Austin.

The study involves the collection of rainfall and runoff data in the Waller Creek basin, a 4.13-square-mile urban watershed in Austin and in the Wilbarger Creek basin, a 4.61-square-mile rural watershed 15 miles northeast of Austin. The data collected in the Wilbarger Creek area which is comparable in size, climate, and geology to the Waller Creek study area will be used for comparison.

Data are being collected from three recording and three nonrecording rain gages and from the two continuous-record stream-gaging stations in the urban watershed of Waller Creek. Three recording rain gages and one continuous-record stream-gaging station provide data for the Wilbarger Creek watershed.

Data collection during the 1974 water year will continue at about the same level as in 1973. Basic-data reports, which contain graphical and tabular data on the rates and volumes of rainfall and runoff from major storms each year, will continue to be prepared annually.

Houston Project

The Houston project, which began in 1964, is in cooperation with the city of Houston and the Texas Water Development Board. The objective of the project is to provide data on the magnitude, frequency, and changes in characteristics of floods that result from progressive urban development.

The data-collection network initially consisted of 7 continuous-record stream-gaging stations, 17 crest-stage partial-record stations (each having recording rain gages), and 5 weighing-type recording rain gages.

The program was expanded during the 1969 fiscal year to include collection of water-quality data on chemical quality, nutrients, BOD, pesticides, and sediment at five sites. During the 1972 fiscal year, periodic chemical-quality samples were collected at 6 additional sites, and samples for coliform counts and minor-element analyses were collected at 17 sites. The program was also expanded in 1972 to include streamflow quality and quantity data collection before development of a planned "satellite town" in the Panther Branch drainage basin about 25 miles north of Houston.

Program changes in fiscal year 1973 included discontinuing 9 of the 17 crest-stage partial-record stations, installing 8 additional weighing-type recording rain gages, and collecting additional samples for water-quality studies. Data collected in the project through September 1969 afforded analyses that resulted in a report "Effects of urbanization on floods in the Houston, Texas metropolitan area" published in April 1973.

During the 1974 fiscal year, data collection in the project in Houston proper will continue at about the same level as in 1973. However, data collection in the Panther Branch drainage basin will be expanded to obtain more water-quality data requisite to definition of hydrologic effects of the "satellite town" planned for the drainage basin.

Basic-data reports, presenting graphical and tabular data for rates and volumes of rainfall and runoff each year, will continue to be prepared annually.

Dallas Project

The Dallas project, which began in 1961, is in cooperation with the city of Dallas. Data collection is expected to permit analyses aimed at achieving the following objectives: To define the changes in storm runoff resulting from progressive urban development; to define the frequency and magnitude of floods on small urban watersheds; and to define flood boundaries and depths of inundation for floods of various magnitudes and frequencies in and along streams traversing the Dallas metropolitan area.

During the 1973 fiscal year, the following changes were made: Data collection at 87 flood-profile gages, 7 recording rain gages, and 1 flood-hydrograph gage was discontinued and data collection started at 3 dual-digital flood-hydrograph gages. An interpretive report "Urban runoff and flood frequency in the Dallas, Texas metropolitan area", based on data collected in the project through September 1970, will be completed during fiscal year 1974.

During the 1974 fiscal year, data collection will be expanded in the Fivemile Creek drainage basin by the establishment of three dual-digital type stations and two weighing-type rainfall stations. Rainfall and flood-stage or discharge data will continue to be collected at 6 continuous-record stream-gaging stations, 13 crest-stage partial-record stations, 2 flood-profile stations, and 29 recording rain-gage stations (including 9 gages at partial-record stations). This extensive hydrologic network covers the White Rock Creek, Turtle Creek, Bachman Branch, Joes Creek, Fivemile Creek, Cedar Creek, and Coombs Creek watersheds in Dallas.

Basic-data reports, presenting graphical and tabular data for rates and volumes of rainfall and runoff each year, will continue to be prepared annually.

San Antonio Project

The San Antonio project was initiated in 1968 in cooperation with the Texas Water Development Board. The objectives of the project are to collect data on rainfall and runoff in an urban area to define the effects of urbanization on the regimen of streamflow. The data-collection network now consists of three continuous streamflow stations, four flood-profile stations, six stage-rainfall (dual-digital) stations, and nine recording rainfall stations.

The data-collection program was expanded during the 1969 fiscal year to include samples collected and analyzed periodically from 11 streamflow sites. Results of these analyses will be included in the annual basic-data reports. Analyses scheduled are: Standard chemical; nutrients; BOD; pesticides; and sediment. The program for 1971 was expanded slightly by the addition of a sediment station at Olmos Creek at Dresden Drive. In 1972, the gaging station at Olmos Reservoir was discontinued.

Data collection during the 1974 water year will continue at about the same level as in 1973. Basic-data reports will continue to be published at the end of each water year.

Fort Worth Project

The Fort Worth project was initiated during the 1969 fiscal year in cooperation with the city of Fort Worth. The objectives of the project are to provide data for a logical approach to flood-zoning and flood-protection problems and to analyze the effects of progressive urbanization on runoff. The data will also be useful in the design of storm sewers, culverts, and bridges.

The data-collection network now consists of 5 continuous streamflow stations, 2 stage-rainfall partial-record stations, 10 weighing-type rainfall stations, and 43 crest-stage flood-profile stations. These stations are located in the Little Fossil, Dry Branch, and Sycamore Creek watersheds.

During 1970, the data-collection network was expanded by the addition of three continuous streamflow stations and four recording rain gages in the Sycamore Creek watershed and a special study area (Seminary South Shopping Center). During the 1971 fiscal year, 16 crest-stage flood-profile stations were added in the Sycamore Creek watershed.

Data collection during the 1974 water year will continue at about the same level as in 1973. Basic-data reports will continue to be published at the end of each water year.

Dallas County Project

The Dallas County urban hydrology study was initiated during the 1969 fiscal year in cooperation with the Dallas County Department of Public Works. The objectives of the project are to provide data necessary for a logical approach to flood-zoning and flood-protection problems and to analyze the effects of progressive urbanization on runoff. These data will also be useful in the design of storm sewers, culverts, and bridges. The study area constitutes all of Dallas County exclusive of the city of Dallas and contains many rapidly urbanizing communities. Those cities in the 20,000 to 100,000 population class include Farmers Branch, Garland, Grand Prairie, Irving, Mesquite, and Richardson. Other communities (less than 15,000 population) include Cedar Hill, Duncanville, DeSoto, Kleberg, Lancaster, Rowlett, Seagoville, and Sunnyvale.

The initial data-collection network established consisted of 1 continuous streamflow station, 2 stage-rainfall (dual-digital) stations, 6 rain-gage stations, and 21 flood-profile crest-stage stations. These stations were located in the Duck Creek and South Mesquite watersheds.

During the 1970 fiscal year, the network was expanded by instrumenting Tenmile Creek watershed with one continuous streamflow station, eight flood-profile crest-stage gages, and five recording rain gages and by adding a streamflow station and three flood-profile crest-stage stations in the Duck Creek watershed.

Data collection during the 1974 water year will continue at about the same level as in 1973. Basic-data reports will be prepared at the end of each water year.

Flood Stages and Discharges for Small Streams in Texas (Highway Program)

The highway program, which began in 1965, is in cooperation with the Texas Highway Department and the U.S. Department of Transportation, Federal Highway Administration. The objective of the project is to define the frequency and magnitude of floods on small rural watersheds having drainage areas of less than 20 square miles. This information is needed to establish criteria for properly designing culverts and bridges on highways. Toward this end, 150 crest-stage partial-record stations have been established throughout Texas. Data on flood magnitudes and volumes and on rainfall amounts and intensities are being obtained at each station.

The first report--a compilation of all peak-discharge data collected in Texas through September 30, 1963, for streams draining about 100 square miles or less--was printed in 1966. This report, entitled "Floods on small streams in Texas" was released in January 1966, as Texas District open-file report no. 89.

Interim report no. 85-2 was released in December 1967, as Texas District open-file report no. 107. This report contains a tabulation of the maximum annual-discharge data through the 1966 water year at 134 sites that have drainage areas of less than 20 square miles. The report also contains a tabulation of rainfall and runoff data from significant storms at 120 sites. Subsequently, five additional interim reports containing data for the 1967, 1968, 1969, 1970, and 1971 water years have been distributed.

Chemical and Physical Characteristics of Water in Estuaries of Texas

This study, begun in October 1967, is in cooperation with the Texas Water Development Board. The full development of the water resources of Texas must provide for the use and preservation of the valuable water resources of the estuaries. The objectives of the study are to collect data on water temperature, pH, dissolved constituents, concentration of nutrients (phosphorus and nitrogen compounds), minor elements, water velocities and directions, and other data necessary to define the source and distribution of nutrients, current patterns and rates of movement, and the physical and organic water quality in areal distribution and time variation.

Four water-quality surveys of the Sabine-Neches, Brazos, East Matagorda, Colorado, Lavaca-Tres Palacios, Guadalupe, Mission-Aransas, Nueces, and Laguna Madre estuaries and hydrodynamic studies of the Lavaca-Tres Palacios, Mission-Aransas, Guadalupe, and Nueces estuaries will be made during fiscal year 1974.

Special investigations to determine the quantity and quality of fresh-water inflow and the exchange of water between the Mission-Aransas and Nueces estuaries and the Gulf of Mexico will be made during fiscal year 1974.

To supplement available tide-stage records being obtained by the U.S. Army Corps of Engineers and U.S. Geological Survey, 20 tide-stage gages funded by the Corps of Engineers are operated by the Geological Survey. Fifteen additional tide-stage gages are operated as part of the cooperative program with the Texas Water Development Board.

The basic-data will be released to interested agencies on as timely a basis as possible and will be released in an annual basic-data compilation. Interpretive reports will be prepared as the data warrant.

Pesticides Program

The Geological Survey pesticides laboratory in Austin makes monthly analyses for a Federal network of stations on streams throughout the western States. Two stations in Texas are included in the network.

Programs in cooperation with the Texas Water Development Board provide for studies of the quantities of chlorinated hydrocarbon pesticides in water and bottom sediments at a network of surface-water stations, in runoff in the Houston and San Antonio urban areas, and in selected wells in counties where ground-water studies are in progress.

Continuing Ground-Water Studies

The continuing ground-water studies are detailed studies that are designed to keep abreast of and to evaluate the effects of large withdrawals of ground water in the areas of concentrated pumping. The need for ground-water information in these areas is determined by the particular problems of the area, and the programs of continuing study are carefully planned to meet specific objectives.

Houston Area

The ground-water study in the Houston district, which began on a more or less continuous basis in 1929, is in cooperation with the Texas Water Development Board and the city of Houston. The program proposed for 1974 is a continuation of basic-data collection. Items of work will include an inventory of all new large-capacity wells; periodic measurements of water levels in about 500 observation wells; operation and maintenance of 6 continuous water-level recorders and 5 compaction recorders; collection of water samples annually from about 90 wells for chemical analyses; conducting pumping tests on new large-capacity wells; and an inventory of annual municipal, industrial, and irrigation pumpage. A report will be prepared showing subsidence in the region to 1973.

Galveston County

The ground-water study in Galveston County, which began in 1931, is in cooperation with the Texas Water Development Board and the city of Galveston. The program for several years has consisted of a compilation and tabulation of water records, including records of water-level fluctuations, changes in water quality, pumpage, and land-surface subsidence. For 1974, the program consists of semi-annual measurements of water levels in 90 observation wells, operation and maintenance of 2 continuous water-level recorders and 1 compaction recorder, observation of the chemical quality of water in 35 wells, inventory of all municipal and industrial pumpage, and observance of the effects of land-surface subsidence.

El Paso Area

The ground-water study in the El Paso area began in 1935 in cooperation with the Texas Water Development Board and the city of El Paso. The program for the 1974 fiscal year is in five parts. The first part of the program consists of a continuation of the collection of basic hydrologic data in the Hueco bolson and Mesilla Valley, measuring about 200 wells annually, 10 semi-annually, 30 quarterly, 4 monthly, and 10 continuously with water-level recorders, inventorying all new wells (excluding shallow irrigation wells), making aquifer tests of large-capacity wells, and collecting water samples from about 14 wells.

The second part of the program consists of completion of a mathematical model of the Hueco Bolson in Texas; the third part consists of preparing data for a model of the lower Mesilla Valley; the fourth part consists of defining more accurately the boundary between fresh and brackish water in the city artesian area; and the fifth part consists of determining the source of saline water entering some of the city wells in the Mesa area.

San Antonio Area and Balcones Fault Zone

The ground-water study in the San Antonio area and Balcones Fault Zone, which began in 1949, is in cooperation with the Texas Water Development Board, Edwards Underground Water District, and the San Antonio City Water Board. The objectives of the study are to appraise quantitatively the ground-water resources in the San Antonio area and along the Balcones Fault Zone from Kinney County to the Hays-Travis County line and to continue to investigate the cause and effect relationships in the Edwards underground reservoir.

The 1974 program consists of continuing to collect and analyze the basic geologic and hydrologic data and to refine the previous evaluations. Items of work include the periodic measurements of water levels in 8 wells; operation and maintenance of continuous water-level recorders on 10 wells; collection of water samples from 5 wells for chemical analyses of inorganic elements and from 50 wells for some but not all inorganic, biologic, and minor elements and pesticides; collection and compilation of records from 10 rain-gaging stations; inventory of all large-capacity wells pumpage and spring discharge; inventory of new wells; and mapping of the principal recharge area of the Edwards underground reservoir. A report summarizing the discharge from the reservoir will be prepared for release in fiscal year 1974.

Orange County and Adjacent Areas

The ground-water study in the Orange County area, which began in 1967, is in cooperation with the Texas Water Development Board and the Sabine River Authority of Texas. The purpose of this study is to keep abreast of the effects of ground-water development in the area and especially to monitor the fresh-water--salt-water interface as a guide to future development of ground water in Orange and adjacent counties to prevent further salt-water intrusion. The magnitude of industrial and municipal development in the area greatly increases the gravity of the situation.

The 1974 fiscal-year program will consist of the inventory of all new large-capacity wells, including the collection of drillers' logs, electrical logs, and well-construction information; measurements of water levels in about 87 observation wells on a semi-annual basis; operation and maintenance of one continuous water-level recorder; and the location of additional wells suitable for water-level recorders. In addition, water samples from about 58 wells are to be collected annually for chemical analysis; annual municipal and industrial pumpage is to be inventoried; and all data currently and previously collected are to be analyzed, interpreted, and correlated.

Other Interpretive Studies

Water Resources of Big Bend National Park

This study, which began in July 1966, is in cooperation with the National Park Service. The objective of the study is to determine the available sources of water for Big Bend National Park. The program in the 1974 fiscal year will include completion of the drilling of a test hole at Ceniza Flats.

Artificial-Recharge Research on the High Plains of Texas and New Mexico

This research project, which began during the 1968 fiscal year, is financed wholly by Federal funds. The study will provide information needed in connection with artificial recharge of water obtained from the playa lakes or imported to the High Plains. The study is also providing the opportunity for applied research on methods of artificial recharge. During the 1974 fiscal year, special emphasis is being placed on recharge from the surface through spreading ponds. Additional work is being done on problems associated with recharge through wells, such as the control of sediment in recharge water. Reports on specific aspects of the recharge studies will be prepared when warranted.

Water Resources of Guadalupe Mountains National Park

This study was begun during the 1969 fiscal year in cooperation with the National Park Service. The objectives are to appraise the water resources of this newly established park. Because the present water supply of the area--obtained from wells and springs--is inadequate for anticipated needs, the study will include a complete inventory of wells and springs with particular attention to those areas of immediate need (Frijoles Ranch site, McKittrick Canyon, and the Bowl). In 1974, two test holes drilled at or near the site of the Visitor's Center at the Frijoles Ranch site and in Dog Canyon will be tested if preliminary data justify.

Hydrologic-Research Studies of the Edwards and Associated Limestones

This ground-water study is in cooperation with the Texas Water Development Board, the Edwards Underground Water District, and the San Antonio City Water Board. All indications, both past and present, indicate that the Edwards Limestone reservoir will, in time, become totally developed (in the amount of the natural recharge), and that it will then become necessary to integrate the use of water from the Edwards with water imported from other sources. At that time, it will be necessary to know in as much detail as possible how to get the most water from the Edwards with the least waste, with a minimum conflict between users, and with a minimum detriment to those users who are in less favorable locations.

This study will provide for the complete appraisal of the availability of water in the Edwards aquifer, thereby furnishing valuable and detailed information not now available to all agencies that may be concerned with water management.

During the 1974 fiscal year, about four test holes will be drilled and cored of which three will be drilled by the Texas Water Development Board in the outcrop area and one will be drilled at or near Mission Station. Geothermal, tracer, and stable-isotope studies; geophysical logging of available wells; evaluation of streamflow records to determine recharge to the reservoir; and studies of the relationship between precipitation and recharge will be continued. Water-level changes will be obtained from 8 recording observation wells, 10 wells measured monthly, and approximately 170 wells measured semi-annually. Water samples for chemical analysis for some but not all inorganic and minor elements will be collected from about 20 wells along the "bad water" line. Reports on specific aspects of the study will be prepared when warranted.

Analog-Model Study of Ground Water in the Houston Area

In 1962-63, an analog model was made of the aquifers underlying the Houston area. This work was done in cooperation with the city of Houston and the Texas Water Development Board. The model successfully duplicated the performance of the aquifer in the heavily developed areas in the immediate vicinity of Houston, but in the adjoining rice-irrigation area, the model failed to duplicate the history of performance, nor did the model successfully duplicate the performance of the Alta Loma Sand, one of the layers modeled. Although the model served the immediate needs of the city of Houston, future plans for ground-water development by the city required that the model be refined so that the conditions in the area to the west of the city, including the rice-irrigation area, be properly simulated. This project is in cooperation with the city of Houston and the Texas Water Development Board. The report will be completed in 1974.

Digital-Model Study of the Chicot and Evangeline Aquifers of the Texas Gulf Coast

The rapidly increasing demands on the ground-water resources in the Gulf Coast area has made it necessary to evaluate the major aquifers along the Gulf Coast of Texas. The ultimate product of the study will be a digital model, which will serve as a guide for the regional development and protection of the aquifers.

The study will be conducted in several phases, the first of which consists of an evaluation of the ground-water supplies in Colorado, Lavaca, and Wharton Counties. The program for 1974 includes the collection of basic geologic and hydrologic data.

Rio Grande Environmental Study

The present water needs (exclusive of irrigation) of the El Paso area are supplied almost entirely from ground-water sources. The known available supplies of fresh ground water are large, but for future growth, additional sources of water need to be identified. The need for the study is to provide reliable information on the amounts and quality of fresh and slightly saline ground water available for development in the Salt basin, Quitman and Presidio bolsons, Mesilla Valley, and La Mesa bolson.

The 1974 program, in cooperation with the Texas Water Development Board, will include completing geophysical surveys, inventorying major wells in the bolsons, and drilling three test holes.

Land-Surface Subsidence in the Baytown Area

The objectives of this study, which is in cooperation with the Corps of Engineers, is to determine the rates and amount of subsidence in the Baytown area and to predict the rate and amount of subsidence for use in planning and constructing the proposed levee or other protective measures.

Extensive development of ground-water supplies and the production of oil and gas in the greater Houston area has caused large pressure declines in the fresh-water aquifers and petroleum reservoirs, resulting in compaction of the fine-grained sediments. In some parts of the area, the compaction has resulted in as much as 6 feet of land-surface subsidence. Near the bays, the subsidence has caused tidal flooding that will probably require the construction of protecting levees.

The collection of data on the relation of pressure decline to compaction will continue during fiscal year 1974. A report summarizing the results obtained during 1973 will be completed in fiscal year 1974.

Mapping of Flood-Prone Areas

The U.S. Geological Survey is mapping flood-prone areas in Texas by delineating the outline of the 100-year flood on existing topographic maps. This program is part of a Nationwide Federal program designed to aid in reducing flood losses. In addition to the 99 quadrangles completed through June 30, 1973, within the Geological Survey program, a cooperative program was developed with the Department of Housing and Urban Development in which an additional 328 7-1/2-minute quadrangles were completed June 30, 1973. An additional 208 quadrangles will be flood mapped by June 30, 1974, bringing the total of 7-1/2-minute quadrangles mapped in Texas to about 635. In addition, the Geological Survey, in cooperation with the Department of Housing and Urban Development, is making more detailed flood studies to establish actuarial rates in the populated areas within the State. A list of the completed maps is given in the section "Reports in Preparation, Released, or Published During Fiscal Year 1974".

Galveston Bay Inflow Study

The objective of this project, which is in cooperation with the Texas Water Development Board, is to determine the quantity and quality of runoff from rural and urban areas to the Galveston Bay system. During fiscal year 1974, data collection will include tributary discharge, inorganic and organic chemical parameters, bacteria counts, and pesticide concentrations at 14 sites. This study was terminated August 31, 1973. Eight of the sites will be continued as a part of the Houston urban study.

Land-Surface Subsidence in the Texas City and Seabrook Areas

The extensive development of ground water and production of oil and gas in Harris and Galveston Counties has caused large pressure declines in the fresh-water aquifers and in the petroleum reservoirs. This decline in pressure has caused compaction of the fine-grained material and has resulted in as much as 9 feet of land-surface subsidence in parts of the area. Lowering of the surface near the bays has subjected land to inundation. High tides cause flooding of the lowland, and much larger areas are subject to flooding by hurricane tides.

The Corps of Engineers, in its concern for losses caused by hurricane flooding, has developed protection plans that include the construction of levees. The objectives of this study are to predict the amounts and rates of subsidence for use in planning, constructing, and maintaining the levees and holding ponds used for protection.

Work during 1974 will consist of maintaining compaction recorders, continuing the collection of basic records, analyzing the data, and completing two reports.

Trinity River Time-of-Travel Study

In 1973, the Corps of Engineers requested a study on the Trinity River to determine the probable time-of-travel of a pollutant and the oxygen "sag" under low-flow conditions. These data will be used in developing a hydrologic model of the river system. A dye was used as a tracer to determine the travel time for different reaches of the river from Fort Worth to Interstate Highway 10. The results of this study were published in 1973.

In 1974, the Trinity River Authority has requested additional studies on the West Fork Trinity River (Fort Worth to Dallas) and the Trinity River downstream from Livingston Reservoir. Studies will be made as flow conditions permit and the results of these studies will be published in the 1975 fiscal year.

Salt-Water Encroachment, Houston Area

The ultimate objectives of the study, in cooperation with the city of Houston and the Texas Water Development Board, are to determine the location of the fresh-water--salt-water interfaces in the aquifers and to determine the rates of movement of the salt water towards centers of pumping.

The extensive development of ground water in the greater Houston area has caused movement of saline water into the fresh-water sands. Increases of chloride concentrations in fresh ground water have been measured adjacent to interfaces in Galveston and Harris Counties for many years. Salt-water contamination in shallow wells in the vicinity of the Houston Ship Channel has been reported. Recently, water from a well completed in the Chicot aquifer near the channel in the vicinity of Houston has become salty. The Chicot aquifer is the major aquifer in Galveston County and southeastern Harris County. Four test holes will be drilled in 1974, and water samples will be collected to determine the source or origin of the salt water.

Summary Appraisals of the Nation's Ground-Water Resources - Texas Gulf Region

The purpose of the regional appraisals is to develop and publish as quickly as possible a broad-spectrum analysis of the Nation's ground-water resources. This rapid survey will demonstrate that the Nation's ground water is a large, important, and usable resource, that in many parts of the Nation it can play a significant role in regional water supply, and that it warrants further study and fuller consideration among alternative water sources in regional water-source developmental planning. Coverage of the 21 Water Resources Council regions over a period of approximately 5 years is contemplated, these appraisals to be followed by more detailed subregional investigations concentrating on priority problems disclosed by the regional studies.

The completed series will constitute a national ground-water compendium for the guidance of planning bodies. In much of the country, ground water has received inadequate attention in regional planning, and this series of reports is one means of correcting that deficiency. Further, the completed appraisal series will document the need for expanded programs of investigation of opportunities for ground-water development. It is not expected that new, original data be generated for these appraisals, but rather that data at hand or readily obtainable receive fresh and original analysis, and that the appraisal program serve as a vehicle for imaginative expression of the Survey's views on the water-supply role of the Nation's ground water.

The report on the Texas Gulf Region will be completed in fiscal year 1974, and will be published in fiscal year 1975 as a U.S. Geological Survey Professional Paper.

Trinity River Basin Water-Quality Monitoring Network

As a part of the cooperative agreement with the Trinity River Authority, a report is being prepared on the design and costs of a water-quality monitoring network for the Trinity River basin. The proposed network will be included in the water-quality management plan the Trinity River Authority is preparing for the Environmental Protection Agency and the Texas Water Quality Board. The report will include installations and operation costs for continuous monitoring of water quality at selected sites on basin streams and telemetry of these data to the office of the water manager.

Basic-Data Reports

Water-Resources Data for Texas

Water resources data for Texas, 1972 - Part I: Surface-water records. Records for the 1972 water year (October 1971 - September 1972), published as a U.S. Geological Survey report.

Water resources data for Texas, 1973 - Part I: Surface-water records. Records for the 1973 water year (October 1972 - September 1973), will be published as a U.S. Geological Survey report.

Water resources data for Texas, 1971 - Part II: Water-quality records. Records for the 1971 water year (October 1970 - September 1971), published as a U.S. Geological Survey report.

Water resources data for Texas, 1972 - Part II: Water-quality records. Records for the 1972 water year (October 1971 - September 1972), will be published as a U.S. Geological Survey report.

Hydrologic Studies of Small Watersheds

Hydrologic data for North Creek, Trinity River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Little Elm Creek, Trinity River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Pin Oak Creek, Trinity River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Mountain Creek, Trinity River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Cow Bayou, Brazos River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Mukewater Creek, Colorado River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for Little Pond and North Elm Creeks, Brazos River basin, Texas, 1972. Limited number of copies to be reproduced by the Texas District.

Urban-Hydrology Studies

Hydrologic data for urban studies in the Fort Worth, Texas, metropolitan area, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for urban studies in the Houston, Texas, metropolitan area, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for urban studies in the Dallas, Texas, metropolitan area, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for urban studies in the Austin, Texas, metropolitan area, 1972. Limited number of copies to be reproduced by the Texas District.

Hydrologic data for urban studies in the San Antonio, Texas, metropolitan area, 1972. Limited number of copies to be reproduced by the Texas District.

Flood Stages and Discharges for Small Streams in Texas (Highway Program)

Flood stages and discharges for small streams in Texas, 1971. This report was released as a U.S. Geological Survey open-file report (Texas Highway Department and Federal Highway Administration Research Study 4-5-65-85, Interim report 85-7).

Flood stages and discharges for small streams in Texas, 1972. This report will be released as a U.S. Geological Survey open-file report (Texas Highway Department and Federal Highway Administration Research Study 4-5-65-85, Interim report 85-9).

Water-Quality Basic Data Reports

Water-quality records for selected reservoirs in Texas, 1970-71 water years. This report was published as Texas Water Development Board Report 177.

Water-quality records for the Hubbard Creek watershed, Texas, October 1969 - September 1972. This report was released as a U.S. Geological Survey open-file report.

Chemical and physical characteristics of water in estuaries in Texas, October 1969 - September 1970. This report was published as Texas Water Development Board Report 171.

Chemical and physical characteristics of water in estuaries of Texas, October 1970 - September 1971. This report will be published as a Texas Water Development Board report.

Selected water-quality records for Texas surface waters, 1971 water year. This report was published as Texas Water Development Board Report 176.

Pesticides in western streams, 1968-71. This report was published in the Pesticides Monitoring Journal, v. 7, no. 1, June 1973.

Ground-Water and Other Basic-Data Reports

Ground-water data for Harris County, Texas: Volume I, Drillers' logs of wells. This report was published as Texas Water Development Board Report 178.

Ground-water data for Harris County, Texas: Volume II, Records of wells. This report will be published as a Texas Water Development Board report.

Ground-water data for Harris County, Texas: Volume III, Chemical analyses of water from wells 1922-71. This report will be published as a Texas Water Development Board report.

Ground-water discharge from the Edwards and associated limestones, San Antonio area, Texas, 1972. This report was published as Edwards Underground Water District Bulletin 32.

Ground-water discharge from the Edwards and associated limestones, San Antonio area, Texas, 1973. This report will be published as a bulletin of the Edwards Underground Water District.

Data on fresh-water inflow, April 14 - July 28, 1973, for analog-model study of the Houston Ship Channel, Houston, Texas. This report will be released as a U.S. Geological Survey open-file report.

Analytical or Interpretive Reports

County Ground-Water Appraisal Reports

Ground-water resources of Navarro County, Texas. This report was published as Texas Water Development Board Report 160.

Ground-water resources of Washington County, Texas. This report was published as Texas Water Development Board Report 162.

Ground-water resources of Brazoria County, Texas. This report was published as Texas Water Development Board Report 163.

Ground-water resources of Donley County, Texas. This report was published as Texas Water Development Board Report 164.

Ground-water resources of Motley and northeastern Floyd Counties, Texas. This report was published as Texas Water Development Board Report 165.

Ground-water resources of Coke County, Texas. This report was published as Texas Water Development Board Report 166.

Ground-water resources of Hall and eastern Briscoe Counties, Texas. This report was published as Texas Water Development Board Report 167.

Ground-water resources of Rains and Van Zandt Counties, Texas. This report was published as Texas Water Development Board Report 169.

Ground-water resources of Wheeler and eastern Gray Counties, Texas. This report was published as Texas Water Development Board Report 170.

Ground-water resources of Val Verde County, Texas. This report was published as Texas Water Development Board Report 172.

Ground-water resources of Kleberg, Kenedy, and southern Jim Wells Counties, Texas. This report was published as Texas Water Development Board Report 173.

Ground-water resources of Blanco County, Texas. This report was published as Texas Water Development Board Report 174.

Ground-water resources of Brazos and Burleson Counties, Texas. This report will be published as a Texas Water Development Board report.

Ground-water resources of Duval County, Texas. This report will be published as a Texas Water Development Board report.

Ground-water resources of Grimes County, Texas. This report will be published as a Texas Water Development Board report.

Other Analytical or Interpretive Reports

Reconnaissance of the chemical quality of surface waters of the Rio Grande basin, Texas. This report will be published as a Texas Water Development Board report.

Floods of September - October 1967 in south Texas and northeastern Mexico. This report will be published as U.S. Geological Survey Water-Supply Paper 1880-B.

Effects of urbanization on floods in the Houston, Texas, metropolitan area. This report was published as U.S. Geological Survey Water-Resources Investigations 3-73.

Effects of urbanization on floods in the Dallas, Texas, metropolitan area. This report will be published as U.S. Geological Survey Water-Resources Investigations 60-73.

Effects of ground-water development on the proposed Palmetto Bend Dam and Reservoir in southeast Texas. This report was published as U.S. Geological Survey Water-Resources Investigations 18-73.

Artificial-recharge experiments and operations on the southern High Plains of Texas and New Mexico. This report was published as U.S. Geological Survey Water-Resources Investigations 10-73.

Summary appraisals of the nations's ground-water resources--Texas Gulf region. This report will be published as a U.S. Geological Survey Professional Paper.

Hydrologic studies of small watersheds, Honey Creek, Trinity River basin, Texas, 1953-69. This report will be published as a U.S. Geological Survey Water-Resources Investigations report.

Preliminary report on land-surface subsidence in the area of Burnet, Scott, and Crystal Bays near Baytown, Texas. This report was released as a U.S. Geological Survey open-file report.

Land-surface subsidence in the area of Burnet, Scott, and Crystal Bays near Baytown, Texas. This report will be published as a U.S. Geological Survey Water-Resources Investigations report.

Analog-model studies of ground-water hydrology in the Houston district, Texas. This report will be published as a Texas Water Development Board report.

A network for continuous monitoring of water quality in the Sabine River basin, Texas. This report was released as a U.S. Geological Survey open-file report.

Water-budget studies of lower Mesilla Valley and El Paso Valley, El Paso County, Texas. This report was released as a U.S. Geological Survey open-file report.

Regional specific yield of the Edwards and associated limestones in the San Antonio, Texas, area. This report was published as a bulletin of the Edwards Underground Water District.

Analog-model studies of the effects of recharge wells along the Houston Ship Channel on potentiometric surfaces of the Chicot and Evangeline aquifers, Houston, Texas. This report was released as a U.S. Geological Survey open-file report.

Hydrologic investigations of the Edwards and associated limestones in the San Antonio area, Texas, progress report, 1970-71. This report was published as a bulletin of the Edwards Underground Water District.

Maps showing outcrops of the Edwards and associated limestones in the principal recharge area of the Edwards aquifer in Bexar County, Texas. The report was released as a U.S. Geological Survey open-file report.

Drainage areas of Texas streams, Guadalupe River basin, Texas. This report was released as a U.S. Geological Survey open-file report.

Drainage areas of Texas streams, Lavaca River basin, Texas. This report was released as a U.S. Geological Survey open-file report.

Quantity and chemical quality of low flow in the upper Colorado River basin, Texas, April 8, 1968. This report was released as a U.S. Geological Survey open-file report.

Quantity and chemical quality of low flow in the Frio River, Texas, December 18-21, 1967. This report was released as a U.S. Geological Survey open-file report.

Quantity and chemical quality of low flow in the East Fork San Jacinto and West Fork San Jacinto Rivers near Houston, Texas, June 24-26, 1969. This report was released as a U.S. Geological Survey open-file report.

Digital-model studies of ground-water resources of the Hueco bolson, El Paso, Texas. This report will be published as a U.S. Geological Survey Water-Resources Investigations report.

Quality of surface water in the Colorado River basin, Texas, 1966-72. This report will be published as a U.S. Geological Survey open-file report.

Ground-water pollution in the vicinity of Toledo Bend Reservoir, Texas. This report will be released as a U.S. Geological Survey open-file report.

A network for continuous monitoring of water quality in the Trinity River basin, Texas. This report will be released as a U.S. Geological Survey open-file report.

The quality of surface waters in Texas. This report will be published as a U.S. Geological Survey Water-Resources Investigations report.

MAPS OF FLOOD-PRONE AREAS IN TEXAS

These maps show the approximate boundaries of the areas subject to inundation by a 100-year flood, which means that on the average, there is about 1 chance in 100 that the delineated areas will be flooded in any year. The names listed under "quadrangle" indicate the name assigned to the U.S. Geological Survey topographic map series.

Quadrangle	in	County
Addison		Collin, Dallas
Alba		Rains, Wood
Algoa		Galveston, Brazoria
Alice North		Jim Wells
Alice South		Jim Wells
Alief		Harris, Fort Bend
Alligator Hole Marsh		Jefferson
Almeda		Harris, Fort Bend, Brazoria
Arlington		Tarrant, Dallas
Bellaire		Harris
Big Sandy		Upshur, Smith
Boerne		Kendall

Quadrangle	in	County
Brady North		McCulloch
Britton		Ellis, Johnson, Tarrant
Bryan East		Brazos
Bryan West		Brazos, Robertson
Buffalo Stadium		Randall
Burleson		Tarrant, Johnson
Calvert		Milam, Robertson
Canyon		Randall
Carrollton		Dallas, Denton
Carthage		Panola
Cedar Hill		Dallas, Ellis
Cleburne East		Johnson
Cleburne West		Johnson
Cleveland		Liberty, San Jacinto
Clodine		Harris, Fort Bend
Coleman		Coleman
Colorado City		Mitchell
Columbus		Colorado
Cotulla		LaSalle
Crosby		Liberty, Harris
Crow		Wood, Smith
Dallas		Dallas
Darco		Harrison, Panola, Rusk
Deadwood (Tex. - La.)		Panola
Dickinson		Galveston
Duncanville		Dallas
Emory		Rains, Hunt, Van Zandt
Euless		Tarrant, Dallas
Falfurrias		Brooks
Fannett East		Jefferson
Fannett West		Jefferson
Ferris		Dallas, Ellis
Fruitvale		Van Zandt
Garland		Dallas, Collin
Gladewater		Gregg, Upshur, Smith
Golden		Wood, Van Zandt, Smith
Grand Saline		Van Zandt, Rains, Wood

Quadrangle	in	County
Grapevine		Tarrant
Greenville Northeast		Hunt
Greenville Southeast		Hunt
Hainesville		Wood
Hallettsville		Lavaca
Hamshire		Chambers, Jefferson
Harmaston		Harris
Hawkins		Wood, Smith, Upshur
Hearne South		Robertson, Milam
Hedwig Village		Harris
Hockley		Waller, Montgomery, Harris
Howe		Grayson
Huffman		Liberty, Harris
Humble		Harris
Hutchins		Dallas
India		Ellis, Dallas, Kaufman
Irving		Dallas
Jacinto City		Harris
Kenedy		Karnes
Kilgore		Gregg
Kingsville		Kleberg, Nueces, Jim Wells
Lampasas		Lampasas
Lancaster		Dallas, Ellis
League City		Galveston, Harris, Chambers
Lindale		Smith, Wood
Longhorn		Bexar
Luling		Caldwell, Guadalupe, Gonzales
Maedan		Montgomery, Harris
Magnolia East		Montgomery
Magnolia West		Waller, Montgomery, Grimes
Manvel		Brazoria
Marshall East		Harrison
Martinez		Bexar
Mauriceville		Newton, Orange
Mesquite		Dallas, Kaufman
Mineola		Wood

Quadrangle	in	County
Missouri City		Fort Bend
Moonshine Hill		Montgomery, Harris
Nacogdoches		Nacogdoches
New Braunfels East		Comal, Guadalupe
New Braunfels West		Comal
Oak Cliff		Dallas
Oklahoma		Montgomery, Harris
Orange		Orange
Orangefield		Orange
Outlaw Pond		Montgomery
Park Place		Harris
Pearland		Harris, Brazoria
Pine Forest		Jasper, Orange, Hardin, Jefferson
Plainview		Hale
Plum Grove		Liberty, Harris, Montgomery
Refugio		Refugio, Goliad, Bee
Rose Hill		Montgomery, Harris
Rowlett		Dallas, Rockwall, Collin
San Antonio East		Bexar
San Antonio West		Bexar
San Saba		San Saba
Satsuma		Harris
Seagoville		Dallas, Kaufman
Seguin		Guadalupe
Settegast		Harris
Sheeks		Liberty, Chambers, Harris
Sherman		Grayson
Sherman Northwest		Grayson
Sonora		Sutton
Southton		Bexar
Splendora		Montgomery, Harris
Spring		Montgomery, Harris
Stephenville		Erath

Quadrangle	in	County
Sugar Land		Fort Bend
Sulphur Springs		Hopkins
Tamina		Montgomery
Tatum		Harrison, Gregg, Rusk
Texarkana (Tex. - Ark.)		Bowie (Tex.), Miller (Ark.)
Texla		Jasper, Newton, Orange
Three Rivers		Live Oak
Tomball		Harris
Van Lake		Van Zandt, Smith
Victoria East		Victoria
Victoria West		Victoria
Voth		Hardin, Jefferson
Waco East		McLennan
Waco West		McLennan
Waller		Harris, Waller
Wellborn		Brazos, Burleson
White Rock Lake		Dallas
Whites Ranch		Chambers, Jefferson

SELECTED LIST OF AVAILABLE REPORTS OF GENERAL INTEREST[1/]

U.S. Geological Survey Professional Paper 787: The Borrego Mountain earthquake of April 9, 1968. Available from Superintendent of Documents - $6.25

U.S. Geological Survey Professional Paper 800-A: Geological Survey Research 1972, Chapter A. Available from Superintendent of Documents - $3.45

U.S. Geological Survey Professional Paper 765: Geology of the oxidized uranium ore deposits of the Tordilla Hill-Deweesville area, Karnes County, Texas: A study of the district before mining, by C. M. Bunker and J. A. Mackallor. Available from Superintendent of Documents - $1.25

U.S. Geological Survey Professional Paper 569-C: Hydrologic significance of lithofacies of the Cane River Formation or equivalents of Arkansas, Louisiana, Mississippi, and Texas by J. N. Payne. Available from Superintendent of Documents - $10.90

U.S. Geological Survey Professional Paper 697: Landslides of Rio De Janeiro and the Serra das Araras escarpment, Brazil, by F. O. Jones. Available from Superintendent of Documents - $1.50

U.S. Geological Survey Professional Paper 732-B: Scour and fill in Tujunga Wash - a fanhead valley in urban southern California - 1969, by K. M. Scott. Available from Superintendent of Documents - 70¢

U.S. Geological Survey Professional Paper 820: United States mineral resources, by D. A. Brobst and W. P. Pratt, editors. Available from Superintendent of Documents - $9.15

U.S. Geological Survey Professional Paper 599-H: Geology of the Sierra Madera cryptoexplosion structure, Pecos County, Texas, by H. G. Wilshire, T. W. Offield, K. A. Howard, and David Cummings. Available from Superintendent of Documents - $2.00

U.S. Geological Survey Professional Paper 751-B: Design and operation of the artificial-recharge plant at Bay Park, N.Y., by Ellis Koch, A. A. Giaimo, and D. J. Sulam. Available from Superintendent of Documents - 95¢

U.S. Geological Survey Professional Paper 809-A: Recognition of Natural brine by electrical soundings near the Salt Fork of the Brazos River, Kent and Stonewall Counties, Texas, by A. A. R. Zohdy and D. B. Jackson. Available from Superintendent of Documents - 40¢

U.S. Geological Survey Professional Paper 809-B: Location and characteristics of the interface between brine and fresh water from geophysical logs of boreholes in the upper Brazos River basin, Texas, by W. S. Keys and L. M. MacCary. Available from Superintendent of Documents - 60¢

U.S. Geological Survey Professional Paper 773: Geologic structures in the Gulf of Mexico basin, by L. E. Garrison and R. G. Martin, Jr. Available from Superintendent of Documents - $2.00

U.S. Geological Survey Professional Paper 802-A: Principles and measuring techniques of turbulence characteristics in open-channel flows by R. S. McQuivey. Available from Superintendent of Documents - $1.80

U.S. Geological Survey Bulletin 1348: Placer gold deposits of New Mexico, by M. G. Johnson. Available from Superintendent of Documents - $1.25

U.S. Geological Survey Bulletin 1356: Placer gold deposits of Nevada, by M. G. Johnson. Available from Superintendent of Documents - $2.00

U.S. Geological Survey Bulletin 1357: Placer gold deposits of Utah, by M. G. Johnson. Available from Superintendent of Documents - $1.25

U.S. Geological Survey Bulletin 1361: An integrated system of geologic mapping and geochemical sampling by light aircraft, by C. L. Sainsbury, K. J. Curry, and J. C. Hamilton. Available from Superintendent of Documents - 90¢

U.S. Geological Survey Bulletin 1292: The geologic story of Mount Rainier, by D. R. Crandell. Available from Superintendent of Documents - 85¢

U.S. Geological Survey Bulletin 1374: Placer deposits of Alaska, by E. H. Cobb. Available from Superintendent of Documents - $3.10

U.S. Geological Survey Water-Supply Paper 1970-B: Summary of floods in the United States during 1968, by J. O. Rostvedt and others. Available from Superintendent of Documents - 60¢

U.S. Geological Survey Water-Supply Paper 2028: A national study of the streamflow data-collection program, by M. A. Benson and R. W. Carter. Available from Superintendent of Documents - 45¢

U.S. Geological Survey Water-Supply Paper 2029-C: Use of finite-difference arrays of observation wells to estimate evapotranspiration from ground water in the Arkansas River Valley, Colorado, by E. P. Weeks and M. L. Sorey. Available from Superintendent of Documents - 50¢

U.S. Geological Survey Circular 670: Fluvial-sediment discharge to the oceans from the conterminous United States, by W. F. Curtis, J. K. Culbertson, and E. B. Chase. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 671: A land-use classification system for use with remote-sensor data, by J. R. Anderson, E. E. Hardy, and J. T. Roach. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 601-H: Role of water in urban planning and management, by W. J. Schneider, D. A. Rickert, and A. M. Spieker. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 601-I: Water facts and figures for planners and managers, by J. H. Feth. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 681: CRIB--The mineral resources data bank of the U.S. Geological Survey, by J. A. Calkins, Olaf Kays, and E. K. Keefer. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 682: Summary of United States mineral recources, by D. A. Brobst, W. P. Pratt, and V. E. McKelvey. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Circular 668: Reports and maps of the Geological Survey released only in the open files, 1972, by B. A. Weld, K. T. Iseri, and M. L. Millgate. Free on application to the U.S. Geological Survey, Reston, Virginia 22092

U.S. Geological Survey Hydrologis Investigations Atlas HA-511: Flood of June 9-10, 1972, at Rapid City, South Dakota, by O. J. Larimer. Available from Distribution Section, U.S. Geological Survey, Federal Center, Denver, Colorado 80225 - 75¢

U.S. Geological Survey Water Resources Investigations 2-72: Water-temperature data acquisition activities in the United States, by F. H. Pauszek. Available from National Technical Information Service, Springfield, Virginia 22151 - $3.00 (PB2-13972)

U.S. Geological Survey Water Resources Investigations Report: The application of remote sensing techniques to inter and intra urban analysis, by F. E. Horton. Available from National Technical Information Service, Springfield, Virginia 22151 - $3.00 (PB2-14449)

U.S. Geological Survey Water Resources Investigations Report: Remote sensing and photo interpretation, by J. E. Colcord. Available from National Technical Information Service, Springfield, Virginia 22151 - $3.00 (PB2-14864)

U.S. Geological Survey Water Resources Investigations 3-72: Urban hydrology - a selected bibliography with abstracts, by G. L. Knapp and J. P. Glasby. Available from National Technical Information Service, Springfield, Virginia 22151 - $6.75 (PB2-19105)

U.S. Geological Survey Water Resources Investigations 3-73: Effects of urbanization on floods in the Houston, Texas, metropolitan area, by S. L. Johnson and D. M. Sayre. Available from National Technical Information Service, Springfield, Virginia 22151 - $3.00 (PB2-20751)

U.S. Geological Survey Water Resources Investigations 73-015: Simulation of major inorganic chemical concentrations and loads in streamflow, by T. D. Steele. Available from National Technical Information Service, Springfield, Virginia 22151 - $3.75 (PB-222 556)

U.S. Geological Survey Water Resources Investigations 72-001: The SYSLAB system for data analysis of historical water-quality records (basic programs), by T. D. Steele. Available from National Technical Information Service, Springfield, Virginia 22151 - $4.50 (PB-222 777)

U.S. Geological Survey Water Resources Investigations 10-73: Artificial-recharge experiments and operations on the southern High Plains of Texas and New Mexico, by R. F. Brown and D. C. Signor. Available from National Technical Information Service, Springfield, Virginia 22151 - $5.25 (PB-222 921)

1/ For publications available from the Superintendent of Documents, order should be addressed to: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

SUMMARY OF COOPERATION

Organizations assisting in collecting data under cooperative agreements with the Geological Survey are:

Texas Water Development Board. Harry P. Burleigh, Executive Director; John H. McCoy, Chairman; Marvin Shurbet, Vice-Chairman; Robert B. Gilmore, Milton T. Potts, Carl Illig, and W. E. Tinsley, Members.

Texas Highway Department. B. L. DeBerry, State Highway Engineer; Charles E. Simmons, Chairman; Herbert C. Petry, Jr. and D. C. Greer, Members.

Pecos River Commission. Horace M. Babcock, Commissioner representing the United States and Chairman; R. B. McGowen, Jr., Commissioner representing Texas; and John B. Walker, Commissioner representing New Mexico.

Sabine River Compact Administration. W. H. Robinson, Commissioner representing the United States and Chairman; R. J. Palmer and H. B. Myers for Louisiana; and J. M. Syler and George Smith for Texas.

County of Dallas. Judson Shook, Director of Public Works.

City of Dallas. Monroe McCorkle, Director of Public Works.

City of Fort Worth. J. M. Graham, Director of Public Works.

City of Houston. E. B. Cape, Director of Public Works.

Assistance in the form of funds or services is furnished by the following Federal agencies:

Department of Housing and Urban Development.

International Boundary and Water Commission, United States and Mexico, U.S. Section.

National Park Service, Department of the Interior.

Soil Conservation Service, Department of Agriculture.

U.S. Air Force, Department of Defense.

U.S. Army, Department of Defense.

U.S. Army, Corps of Engineers, Albuquerque District, New Mexico.

U.S. Army, Corps of Engineers, Fort Worth District, Texas.

U.S. Army, Corps of Engineers, Galveston District, Texas.

U.S. Army, Corps of Engineers, Little Rock District, Arkansas.

U.S. Army, Corps of Engineers, New Orleans District, Louisiana.

U.S. Army, Corps of Engineers, Tulsa District, Oklahoma.

Veterans Administration.

Assistance in the form of funds or services is rendered by the following organizations through the Texas Water Development Board:

Cities

Abilene	Clyde	Graham
Alice	Corpus Christi	Houston
Arlington	Dallas	San Angelo
Austin	El Paso	Wichita Falls
Brady	Gainesville	
Cleburne	Galveston	

Other Agencies

Athens Municipal Water Authority

Bexar-Medina-Atascosa Counties Water Improvement District No. 1

Bistone Municipal Water Supply District

Brazos River Authority

Chocolate Bayou Company

Colorado River Municipal Water District

Dallas County

Dallas Power and Light Company

Dow Chemical Company

Edwards Underground Water District

Franklin County Water District

Greenbelt Municipal and Industrial Water Authority

Guadalupe-Blanco River Authority

Harris County Flood Control District

Houston Lighting and Power Company

Lone Star Steel

Lower Colorado River Authority

Lower Neches Valley Authority

Mitchell Development Corporation of the Southwest

Northeast Texas Municipal Water District

Palo Pinto County Municipal Water District No. 1

Red Bluff Water Power Control District

Reeves County Water Improvement District No. 1

Richmond Rice Association

Sabine River Authority of Texas

San Antonio City Public Service Board

San Antonio City Water Board

San Antonio River Authority

San Jacinto River Authority

Tarrant County Water Control and Improvement District No. 1

Texas Electric Service Company

Texas Utilities Services Inc.

Tom Green County Water Control and Improvement District No. 1

Trinity River Authority

Upper Guadalupe River Authority

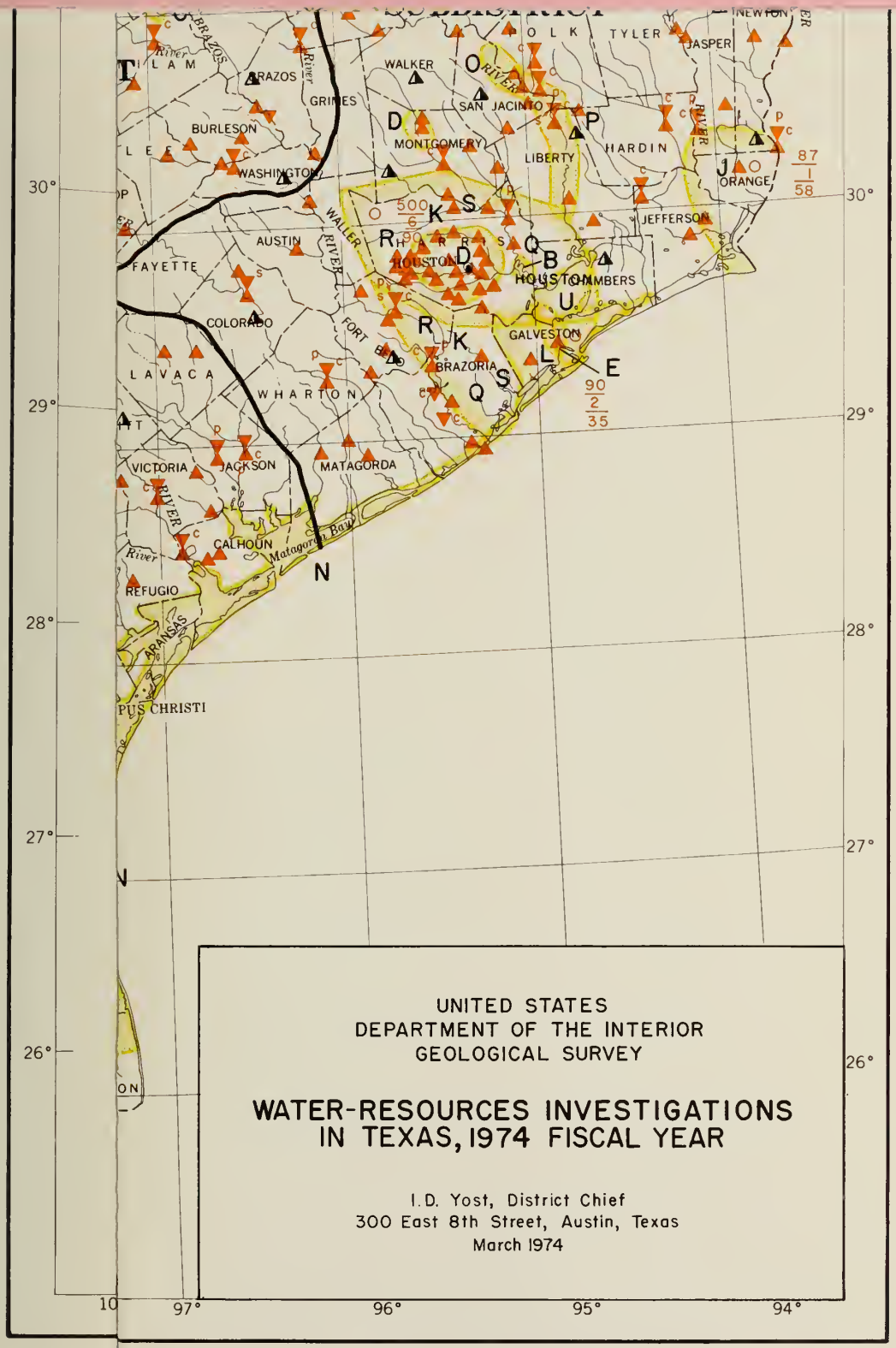
Upper Neches River Municipal Water Authority

West Central Texas Municipal Water District

White River Municipal Water District

Wichita County Water Improvement District No. 2

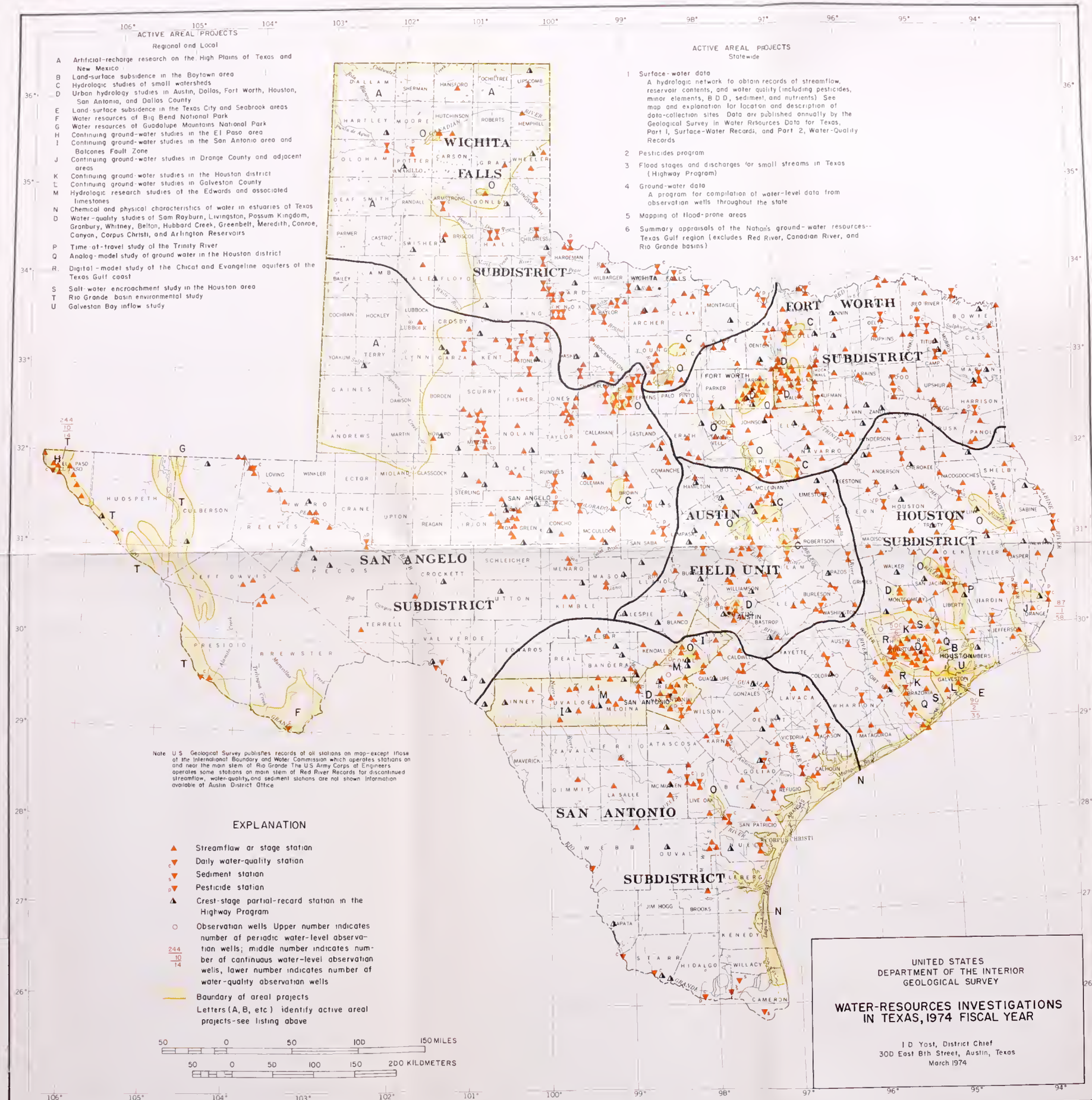
Wood County



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS IN TEXAS, 1974 FISCAL YEAR

I. D. Yost, District Chief
300 East 8th Street, Austin, Texas
March 1974


ACTIVE AREAL PROJECTS
Regional and Local
A Artificial-recharge research on the High Plains of Texas and New Mexico
B Land-surface subsidence in the Baytown area
C Hydrologic studies of small watersheds
D Urban hydrology studies in Austin, Dallas, Fort Worth, Houston, San Antonio, and Dallas County
E Land-surface subsidence in the Texas City and Seabrook areas
F Water resources of Big Bend National Park
G Water resources of Guadalupe Mountains National Park
H Continuing ground-water studies in the El Paso area
I Continuing ground-water studies in the San Antonio area and Balcones Fault Zone
J Continuing ground-water studies in Orange County and adjacent areas
K Continuing ground-water studies in the Houston district
L Continuing ground-water studies in Galveston County
M Hydrologic research studies of the Edwards and associated limestones
N Chemical and physical characteristics of water in estuaries of Texas
O Water-quality studies of Sam Rayburn, Livingston, Possum Kingdom, Granbury, Whitney, Belton, Hubbard Creek, Greenbelt, Meredith, Conroe, Canyon, Corpus Christi, and Arlington Reservoirs
P Time-of-travel study of the Trinity River
Q Analog-model study of ground water in the Houston district
R Digital-model study of the Chicot and Evangeline aquifers of the Texas Gulf coast
S Salt-water encroachment study in the Houston area
T Rio Grande basin environmental study
U Galveston Bay inflow study
ACTIVE AREAL PROJECTS
Statewide
1 Surface-water data
A hydrologic network to obtain records of streamflow, reservoir contents, and water quality (including pesticides, minor elements, B.O.D., sediment, and nutrients). See map and explanation for locaton and description of data-collection sites. Data are published annually by the Geological Survey in Water Resources Data for Texas, Part 1, Surface-Water Records, and Part 2, Water-Quality Records
2 Pesticides program
3 Flood stages and discharges for small streams in Texas (Highway Program)
4 Ground-water data
A program for compilation of water-level data from observation wells throughout the state
5 Mapping of flood-prone areas
6 Summary appraisals of the Nation's ground-water resources--Texas Gulf region (excludes Red River, Canadian River, and Rio Grande basins)
WICHITA FALLS SUBDISTRICT
FORT WORTH SUBDISTRICT
AUSTIN FIELD UNIT
HOUSTON SUBDISTRICT
SAN ANGELO SUBDISTRICT
SAN ANTONIO SUBDISTRICT
Note U.S. Geological Survey publishes records of all stations on map except those of the International Boundary and Water Commission which operates stations on and near the main stem of Rio Grande. The U.S. Army Corps of Engineers operates some stations on main stem of Red River. Records for discontinued streamflow, water-quality, and sediment stations are not shown. Information available at Austin District Office
EXPLANATION
Streamflow or stage station
Daily water-quality station
Sediment station
Pesticide station
Crest-stage partial-record station in the Highway Program
Observation wells. Upper number indicates number of periodic water-level observation wells; middle number indicates number of continuous water-level observation wells, lower number indicates number of water-quality observation wells
Boundary of areal projects
Letters (A, B, etc.) identify active areal projects-see listing above
50 0 50 100 150 MILES
50 0 50 100 150 200 KILOMETERS
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER-RESOURCES INVESTIGATIONS IN TEXAS, 1974 FISCAL YEAR
I. D. Yost, District Chief
300 East 8th Street, Austin, Texas
March 1974

UNIVERSITY OF ILLINOIS-URBANA
3 0112 084234738